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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,723	03/23/2004	Atsushi Kamachi	SIW-078	4432
959	7590	12/07/2006	EXAMINER	
LAHIVE & COCKFIELD, LLP ONE POST OFFICE SQUARE BOSTON, MA 02109-2127			CREPEAU, JONATHAN	
			ART UNIT	PAPER NUMBER

1745

DATE MAILED: 12/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/807,723	<b>Applicant(s)</b> KAMACHI ET AL.	
	<b>Examiner</b> Jonathan S. Crepeau	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 8 and 10 is/are rejected.
- 7) ☒ Claim(s) 5, 6 and 9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/13/04</u> <u>9/8/04</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Ando et al (U.S. Patent 6,127,054 and *Intersociety Energy Convers.*, 1997).

Each of these references teaches an integrated dehydrogenation reactor/fuel cell apparatus. Organic material (e.g., isopropanol) is supplied to negative electrode containing a catalyst, where it is reacted in the presence of solar heat to form acetone and molecular hydrogen. The hydrogen then reacts electrochemically in the fuel cell to generate electricity. Isopropanol is regenerated from acetone, protons, and electrons at the fuel cell cathode, which is an exothermic reaction and thus also supplies heat to the dehydrogenation on the negative electrode. Regarding claims 3 and 4, the dehydrogenation catalyst layer is in contact with the electricity generating layer of the fuel cell.

Thus, the instant claims are anticipated.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Ando et al. patent and article.

Both Ando et al. references are applied as stated above. However, neither reference expressly teaches a heating medium circulating path for circulating a heating medium between the dehydrogenation reactor and the fuel cell, as recited in claim 10.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to modify the systems disclosed in the Ando et al. references to include such a circulation path. Both documents disclose that solar heat or waste heat may be used to heat the negative electrode. Further, as best illustrated in Figure 2 and as discussed in both the article and the patent, a thermal gradient must exist between the negative and positive electrode for the cell to function properly (see heater 7 and cooler 10 in Fig. 2 of patent). The addition of a closed loop connecting both heat exchange elements would allow heat generated at the positive electrode to be supplied to the negative (dehydrogenation) electrode, thereby allowing efficient use of the heat generated by the hydrogenation reaction on the cathode. As such, the subject matter of claim 10 would be rendered obvious to the skilled artisan.

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5. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Ando et al. patent and article in view of Wilson et al (U.S. Patent 5,798,187).

Both Ando et al. references are applied as stated above. However, neither reference expressly teaches that the catalyst layer and the electricity generating layer are each formed of a metal substrate.

Wilson et al. is directed to a fuel cell with a metal screen flow field (see abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the metal screen flow fields of Wilson et al. in the fuel cells of the Ando et al. documents, thereby resulting in the claimed configuration. In the abstract, Wilson et al. teach that such a flow field allows a reactant to be uniformly distributed over the surface of the MEA. As such, the artisan would be motivated to use the metal screen flow fields of Wilson et al. in the fuel cells of the Ando et al. documents. Since one screen would be located adjacent the respective negative electrode and the other adjacent the positive electrode, the former would correspond to the claimed "catalyst layer formed from a metal substrate" and the latter would correspond to the claimed "electricity generating layer formed from a metal substrate." As such, the subject matter of claims 7 and 8 would be rendered obvious.

***Allowable Subject Matter***

6. Claims 5, 6, and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

Dependent claims 5 and 6 recite that catalyst layers are stacked on both sides of a supply and discharge layer. The Ando et al. patent and article do not teach or fairly suggest this configuration.

***Conclusion***

8. Regarding JP 61-072995 and JP 2002-208430, indicated as "X" documents on the European Search Report, these references have been considered but not applied herein because they are considered to be cumulative of the art applied above.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (571) 272-1292. The phone number for the

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organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau  
Primary Examiner  
Art Unit 1745  
December 4, 2006